COMMONWEALTH OF MASSACHUSETTS

BEFORE THE

DEPARTMENT OF TELECOMMUNICATIONS AND ENERGY

Investigation by the Department of Telecommunications and Energy on its own Motion into Distributed Generation.	)	D.T.E. 02-38

INITIAL COMMENTS OF
WESTERN MASSACHUSETTS ELECTRIC COMPANY

On June 13, 2002, the Department of Telecommunications and Energy ("Department") issued an Order opening a Notice of Inquiry into distributed generation ("DG"). Western Massachusetts Electric Company ("WMECO") respectfully submits the following comments to the four questions set out by the Department in its June 13th Order.

1. **Refer to current distribution company interconnection standards and procedures in Massachusetts. Do these standards and procedures act as a barrier to the installation of distributed generation? If so, please describe.**

WMECO's current interconnection standards and procedures do not act as a barrier to DG. Numerous DG units have been successfully interconnected to the WMECO distribution system over the past decade.

WMECO's interconnection standards and procedures are required to protect the safety of our customers and employees from serious harm. Therefore, it is important that such interconnection standards are clearly defined and properly applied. This need for proper interconnection guidelines should not be considered a barrier to DG interconnection, but rather be recognized as a necessary

safety function. Proper interconnection guidelines are also a benefit to DG suppliers because it avoids problems associated with technically deficient interconnection.

In addition to current interconnection standards and procedures, WMECO suggests other issues that need to be resolved to best support the presence of DG. These include:

- The potential degradation of the electrical performance (power quality, reliability, voltage) of distribution feeders by the interconnection of many small generators. WMECO's distribution systems were not designed to accommodate a significant amount of generation supplied by numerous individual generators. The interaction of several generators on one circuit as well as the potential for "islanding"[1] a block of load with some DG is also a concern.

- The control of multiple DG units to ensure availability. More complex protection and remote control schemes may be required. These added costs must be included when comparing DG to conventional options for distribution upgrades.

- The complexity of interconnecting distribution networks and systems in urban areas, where primary circuits are either tied together or looped, needs to be recognized. These systems pose unique challenges in DG interconnection.

At the state level, utility system designs, along with operating and maintenance procedures, vary from company to company in Massachusetts, and, hence, there are opportunities for greater standardization. Accordingly, WMECO supports the establishment of a set of standard technical requirements for distributed resource interconnection to replace the numerous local practices and guidelines that exist today. WMECO and the other Massachusetts utilities, Fitchburg Gas and Electric Light Company, Massachusetts Electric Company, and NStar, have begun meeting to review their interconnection standards in an effort to establish standard interconnection procedures for DG units less than 10 kilowatts ("kW").

[1] A condition in which a portion of the distribution company system that contains both load and DG is isolated from the remainder of the distribution company system.

a. If the current standards and procedures act as barriers to the installation of distribution generation, please describe what steps the Department should take to remove these barriers. As part of this response, please discuss whether the Department should establish uniform technical interconnection standards and procedures for distributed generation.

WMECO agrees that uniform interconnection and operating standards will facilitate the interconnection of DG, as will greater utility experience with interconnections. WMECO recommends the following steps be taken:

- Establish a statewide standard type-acceptance testing program for:
  - Inverter-based systems based on UL 1741, the standard for "Static Inverters and Charge Controllers, and ANSI/IEEE C62.41 and C62.45, "Surge Withstand Standards."
  - Relay systems based on ANSI/IEEE C62.41 and C62.45, or C37.90, and C37.90.2, "Surge Withstand Standards" (whichever set of standards apply). Once the inverter/relay systems have been type-approved, they may be applied by the DG as appropriate).
- Establish uniform interconnection standards based on:
  - IEEE 929, the recommended Practice for Utility Interface of Photovoltaic Systems for Inverters rated 10 kW and less.
  - IEEE P-1547 "Standard for Interconnection Distributed Resources with Electric Power Systems" and associated IEEE Standards P-1608, P-1589, and P-1614 for inverter-based systems greater than 10 kW and other relay-based DG systems. It is important that the technical standards be consistent within Massachusetts and to further facilitate the interconnection of DG from one state to the next.
- Establish a statewide standardized contract for small scale, high efficiency DG systems.
- Establish clearly defined coordination and notification requirements necessary to ensure operation of units will not cause damage to either the WMECO system or the DG system.
- Establish appropriate mechanisms to recover costs of managing these interconnections so as to not increase WMECO's delivery costs for other customers.

?? To address these recommendations, the Department should consider organizing a collaborative effort among all stakeholders.

b. Please comment on whether the Department should adopt the IEEE's uniform technical interconnection standards, or the uniform standards adopted by other states, for use in Massachusetts.

The Department should consider adopting and endorsing the use of IEEE 929 for inverter-based photovoltaic ("PV") systems 10 kW and less, and IEEE P-1547 "Standard for Interconnection Distributed Resources with Electric Power Systems" for other DG systems. When finalized, the P-1547 standard will provide uniform criteria and requirements for the performance, operation, testing, safety considerations, and maintenance of the interconnection. This standard is meant to set the technical requirements in a way that can be universally adopted. The universality relates not only to the technical aspects, but also to the adoption of this standard as being applicable across a number of industries from manufacturers, utilities, and energy suppliers to regulators and legislators.

In addition to the IEEE's uniform interconnection standards, the Department should also consider adopting the NARUC Model Distributed Generation Interconnection Procedures and Agreement as a guideline. Adopting the NARUC Model as a guideline provides continuity between states while being flexible enough to allow individual state concerns to be addressed.

2. Refer to current distribution company standby service tariffs. Do these tariffs act as a barrier to the installation of distributed generation? If so, please describe.

No, although some DG proponents may characterize standby rates as a barrier. In fact WMECO's current tariffs have provisions that benefit DG applications. Customers with applications up to 60 kW receive credit for all rate components, including generation, through WMECO's net metering provisions. Moreover, standby service customers by nature have unpredictable load characteristics that

vary by DG type and installation. DG standby customers receive standard offer and default service pricing that is lower than what they could expect on a stand-alone basis due to their less desirable load factor.

Standby rates are an important consideration in making the decision to install DG; however, the real issue is not the rate, but rather the cost to provide the service. For the most part, WMECO's tariffs appropriately recover the fixed costs of providing distribution and transmission service. The most significant, potential hurdle to DG market development lies in an area in which WMECO has no control: the cost of generation supply. The inability of a supplier to plan for a standby customer's energy requirements and the need to reserve capacity for those requirements adds to a supplier's price risk, which translates to higher cost of supply (whether through standard offer, default or third party arrangements).

Given these considerations, standby rates are only one component in determining whether or not a DG installation is economic. Standby rates should accurately reflect costs so that inefficient DG will not be installed based on rate subsidies from other customers. Properly designed standby service tariffs should also limit a distribution company's exposure for under recovery of costs associated with designing and maintaining a system with DG.

a. Please discuss the appropriate method for the calculation of standby or back-up rates associated with the installation of distributed generation. As part of this response, please discuss whether other states have established policies regarding back-up rates associated with distributed generation that may be appropriate for adoption in Massachusetts.

As a general matter, distribution company rates should be designed to allow for the timely recovery of distribution company costs and should align system costs with system benefits. There are a number of structural considerations that need to be considered in designing rates for DG customers,

foremost being the diverse and yet unknown set of applications needs to be addressed. The potential DG "market" conceivably ranges from small residential applications (e.g., PV technologies) to large commercial and industrial installations (e.g., 10-20 MW cogeneration facilities). Furthermore, the operating characteristics and interplay between any one of these applications and both the distribution company's delivery system and the associated market system will present a dynamic set of service conditions. Rate design should generically cover the conditions described above, but must also be applied to each DG customer application. To develop an overall structure for rate design, the services to be provided may be considered to fall in the following categories: (a) Partial Use: the distribution company provides both backup and supplemental service; there is no generation delivered to the delivery system; (b) Backup Only: the DG sells to the energy market via the distribution company's delivery system and the distribution company provides backup service. These DG uses, and the following rate design discussion should focus on potential "behind-the-meter" applications (for either full requirements, end users who newly install DG, or new, metered, non-utility installations). To the extent utility-owned distributed generation is considered, it should not be subject to tariffs, but rather be considered as company-use.

A challenge in designing DG rates is that actual data for detailed load and rate class/subclass development will become available as the DG market evolves. Regardless of how this market evolves, a number of key rate principles should apply. The general rate structure should be designed on an unbundled basis, and accomplish the following:

- *Provide fixed and demand-based rate structures to recover distribution company requirements.* In addition to the site-specific interconnection costs, DG customers should be responsible for their share of the fixed cost of the distribution company's system infrastructure and the cost of providing standby service. These costs are reflected in both customer service and demand charge components of rates. To the extent demand charges are used, rates should be

based on customers' potential maximum demands, recognizing that the distribution company must stand ready and have the necessary infrastructure in place to meet the potential unscheduled demand of each customer during peak periods. Thus, charges should be based on contractual maximum demand commensurate with the utility's potential delivery obligation, not actual demand.

- *Correlate transmission service pricing with the as-used nature of transmission cost*. Currently, backup service customers cause the distribution company to incur transmission costs on the basis of their contribution to the system peak. The transmission component of DG rates should reflect recovery of the distribution company's transmission costs consistent with how those costs are incurred.

- *Maintain Transition Cost responsibility.* Standby service customers have the same stranded cost recovery obligations that any other customer would have. The otherwise applicable general service rates should be the basis for determining the applicable charge.

- *Maintain separate treatment of standard offer or default service pricing, consistent with regulatory policy*. This preserves DG customers' ability to retain the benefit of taking standard offer service, default service, or third-party generation supply.

- *Recognize renewable resources within the DG mix*. WMECO recommends consideration of a moratorium period in order to recognize and foster development of renewable DG resources. For those DG resources that qualify as renewable technologies, a rate moratorium should apply by which the renewable energy charge would be waived for a specified period of time.

Considerations in designing rates must also be made for the impact on tariffs and costs over time as the DG market evolves, and the administrative requirements of implementing rates. The availability of data and experience with DG applications are key factors in assessing and adjusting rates as necessary.

- Net metering should be revisited both up front and as a significant market is established to ensure that DG rate treatment is appropriate and does not create undue subsidies or cost shifting to other customers.

- Administrative simplicity should be a goal, both from the customer and the distribution company's perspective. It may be best to offer a range of services, designed on the basis of customer and technology mix and market penetration. Differentiation of services may be either through an umbrella tariff, or separate tariffs, and could depend upon such standard factors as voltage or service class, as well as types of service desired by customers. Again, simplicity is most desirable, especially at this early stage of the DG market.

In terms of standby rates for other states, structures for both DG and non-DG applications should be considered. It is also important to note that state jurisdiction over standby service is assumed, as is the ability of a generator customer to procure generation supply for backup or standby needs from either utility or non-utility sources, consistent with state and federal authorized rates.

In the Northeast there are several structures that provide insight into the development of standby rates in Massachusetts. New York ("NY") state utilities focus on developing separate standby rates for differentiated classes of service (e.g., residential, general service, time-of-day). Narragansett Electric, a Rhode Island utility, also has standby service tariffs for separate service classes. Both WMECO and The Connecticut Light and Power Company ("CL&P") have in place all-encompassing "umbrella" tariffs which provide terms and conditions for specific customer applications (e.g., contract demands, recognition of outage schedules, service level adjustments) and apply a combination of pricing from otherwise applicable tariffs and pricing specific to the standby/backup service class (although WMECO's rate PR is closed to new applicants, and thus new standby/backup service requirements are provided under general service rates). It is WMECO's understanding that other states, e.g., Texas, do not offer separate standby/backup rates, but rather assign DG customers to the appropriate standard general service tariffs.

Recovery of distribution delivery costs is generally sought on a fixed basis, with variations of these charges to recognize class differences as defined in full requirements rates. NY recognizes potential small DG applications, and differentiates treatment of customers above and below 50 kW (comparable to the 60 kW threshold in Massachusetts). Generally costs currently allocated in existing standard service classifications form the basis for designing class-specific standby service delivery charges. Cost-based rate design in most service classes avoids reliance on kWh consumption. This

approach is recognized as neither a barrier nor an unwarranted incentive to customers contemplating the installation of DG or on-site generators. Contract or peak demand charges, fixed monthly access charges and customer charges, rather than volumetric rates, for recovery of delivery service costs serve to match the local costs of providing delivery service with the size of the facilities needed to meet the generating customer's maximum demand for delivery service.

In addition to fixed recovery of delivery costs, another theme found in many states is recognition of standby service customer stranded cost responsibility. For example, NY standby service customers contribute to stranded costs in the same proportion of their delivery rates as customers in the otherwise applicable service classification. Both WMECO and CL&P standby/backup service customers contribute to stranded cost recovery on the basis of their proportion of peak period usage.

3. Please discuss the role of distributed generation with respect to the provision of reliable, least-cost distribution service by the Massachusetts distribution companies.

Distributed generation has been in use for decades. Until recently DG has been primarily used as backup generation or as supplemental supply for large commercial customers. To date, installation of smaller DG scattered throughout the WMECO service territory has not adversely impacted our distribution system. If the deployment of DG units becomes significant, WMECO will need methods of accumulating separate load and generation data for distribution planning purposes. Planning studies will need to analyze the effects of multiple units running at various load levels to ensure that voltages and fault currents are kept within specified limits.

Thus far, WMECO has not considered DG in its distribution planning process since DG does not have a guaranteed availability when needed for peak load relief. WMECO has studied several larger DG-unit proposals (i.e., several MW) over the past few years which would have caused high

voltage and high fault current levels on our distribution system. Options to remediate these problems are costly and they can include installation of reactors, static var compensators, or dedicated substation transformers.

a. What steps should the distribution companies take in order to identify areas where the installation of distribution generation would be a lower-cost alternative to system upgrades and additions?

WMECO is committed to seek out ways in which DG could offer a more cost-effective solution to the conventional wires approach. Distribution companies need to characterize and cost out potential DG solutions and wires alternatives and select the most reliable, economic and timely solution to address specific planning problems. While DG that is designed to operate both in parallel with a distribution feeder or isolated on a customer's load may provide reliability or power quality for that customer, it generally does not provide these benefits to all other customers on the same feeder and to the distribution grid as a whole.

The replacement of DG for a conventional wires solution, therefore, needs to occur under some carefully defined conditions:

- First, the DG must be installed and used, in anticipation of, and as an alternative to, an increase in distribution capacity. DG installed on a distribution circuit that has capacity for significant load growth in a given area will increase costs with no additional distribution system benefits.

- Second, DG must provide for the same level of system reliability and assured quality of service to the distribution company's customers as the alternative distribution upgrade. This requires a level of redundancy that provides reliability and assurance of availability when needed with penalties for failure to operate. It will also require contract terms and conditions and may require financial security or performance guarantees in some situations. Ultimately, WMECO has the obligation to serve, to accommodate load growth, and to provide quality service to all customers.

?? Third, the DG must be a cost-effective option in attainment of the distribution company's obligation to provide reliable distribution service. The goal is to reduce the distribution company and customer costs without sacrificing reliability and power quality as opposed to a goal based on the number of DG units or DG load installed.

b. What steps should the distribution companies take to encourage the installation of cost-effective distributed generation in their service territories?

Distribution companies can take the following steps to encourage DG within their service territories:

?? Standardize application and approval procedures.
?? Simplify procedure for DG units less than 10 kW.
?? Encourage funding from agencies such as the Massachusetts Renewable Energy Trust.
?? Identify areas on the distribution system where DG could defer traditional capacity-related projects.

In addition, WMECO is funding renewable energy initiatives through a solar panel program for residential customers. WMECO is currently working with the other Massachusetts utilities to address the first two bullets above. Lastly, WMECO offers a load response program to major customers which provides for some load reduction during peak load periods. In 2001, WMECO enrolled 4.4 MW of customer load which included 47 percent of all Class 1 (Demand Response) load enrolled in New England. WMECO has promoted the program again this year with a direct mailing and by hosting two customer seminars. WMECO expects to increase enrollment by at least 1 MW this year.

In addition to the items listed above, Northeast Utilities ("NU") affiliated companies are currently doing a number of things to promote DG technologies as described below:

?? NU has invested shareholder money in rooftop solar PV installations to create interest among its customers in sharing costs for making such installations. In western Massachusetts, 500-watt solar PV panels were placed on 30 homes as part of WMECO's "Solar Avenue" program. WMECO contributed half of the cost of those panels, or $80,000. NU is hoping to expand this program with assistance from the clean energy funds in Massachusetts and Connecticut.

?? NU has invested shareholder money in a small DG company (Acumentrics) with some very promising fuel cell technologies. When these technologies are commercially proven, NU intends to be a distributor of these products, in the range of 3-250 kilowatts per unit.

?? NU has managed the use of ratepayer Conservation and Load Management funds to advance distributed generation technologies. Currently, there are 11 Conservation and Load Management Research and Development Distributed Resources Projects at a funding level of $5.2 million newly approved by the Connecticut Energy Conservation Management Board.

4. What other issues are appropriate for consideration as part of the Department's investigation of distributed generation?

WMECO has identified several issues that should be considered as part of the Department's investigation of DG. These include:

?? **Emissions regulations, environmental rules and regulations**

Environmental permitting of certain generating units, specifically diesel generators and to a lesser extent other fossil fuel-fired units, may be a potential DG barrier. These permitting processes are not well suited for smaller generating sources. Such units tend to have high emission rates and low stack heights that promote ground level exposures. In the aggregate, such units could significantly affect the region's air quality, specifically for ozone and fine particulate matter. WMECO suggests the Massachusetts Department of Environmental Protection develop a general permit that will simplify the permitting process as well as appropriately protecting the Commonwealth's air quality.

?? **Jurisdictional issues FERC v. State**

In issuing its Notice of Proposed Rulemaking for national generator interconnection standards the Federal Energy Regulatory Commission ("FERC") included suggested standards for the interconnection of small generation equipment. Small generators are defined by FERC as those units less than 20 MW in capacity. FERC intends to adopt a standard generator interconnection agreement together with a standard interconnection procedure that would become part of the open access transmission tariff of every public utility and be available to any generator desiring interconnection to any public utility. FERC has indicated that it wants to eliminate the distribution voltage level as a line determining state versus federal jurisdiction over interconnection. The test FERC adopted is the "sales for resale" test. If a small generator is producing energy that will be re-sold, then FERC intends that its interconnection rules will apply even if the unit is interconnecting with the distribution system at distribution voltages. Traditionally distribution interconnections have been regulated at the state level. NARUC has also issued its standard model for interconnection. These proposals could put WMECO, as

well as other distribution companies, in the impossible situation of trying to adhere to conflicting state and federal regulations.

?? **Utility Ownership of DG**

Distribution companies should be permitted to own DG both on grid and behind the customer's meter. Use of DG as an alternative to a conventional wires solution necessitates high levels of reliability and dispatch control and an ability to secure such resources in the most cost effective manner. DG units located in substations and along primary distribution lines possess the greatest opportunity for benefiting the most customers in terms of distribution system deployment of DG. In addition, using DG as a cost-effective adjunct will help to catalyze market penetration of DG.